

(ILS) circular anastomotic instruments and finally the production of all of these in a disposable form. The EEA and ILS instruments, in particular, have been beneficial in that very low colorectal anastomoses can now be done in patients who previously had to have abdominoperineal resections. Additional applications have been found for these circular staplers in upper colon, gastric and esophageal procedures.

Other stapling devices have received somewhat less widespread acceptance, for example, ligating and dividing staplers, fascial staplers and skin staplers.

It has been claimed that stapled anastomoses can be done more rapidly and with less effort on the part of the surgeon than the hand-sewn ones, and thus they are a financial saving because of decreased operating and anesthesia time. Reportedly they lead to better and more rapid healing because of the more adequate blood supply to the edge of the bowel and less trauma from the multiple manipulations of hand sewing. It is also claimed that stapled anastomoses lead to a shorter, less complicated postoperative course from ileus, anastomotic leaks and so forth. Several studies report, however, that operative times and complication rates between the two techniques are not proving to be significantly different. Perhaps these will change as surgeons and surgical teams gain more facility and experience in the use of these instruments.

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## Digital Video Subtraction Angiography and Peripheral Vascular Surgical Procedures

PERIPHERAL VASCULAR SURGERY and contrast radiography have shared an important and essential relationship. Whether it be aortic, femoral or carotid arterial occlusion, an endarterectomy or bypass procedure is seldom done without prior angiographic delineation. Despite its widespread usage, arteriography continues to involve a small but potentially serious incidence of adverse complications through embolism or thrombosis, which can lead to limb loss or stroke. For this reason, the diagnostic study of arterial diseases has been supplemented by a vast and rapidly growing noninvasive vascular diagnosis industry. As yet, noninvasive techniques lack precise definition and have not replaced angiography.

Recent developments in computerized digital video subtraction angiography have virtually eliminated the more serious risks of arteriography by avoiding intra-arterial catheterization. The method originally described by Robb and Steinberg in 1939 has been supplanted by more recent advancements in computer technology. This new technique essentially separates and amplifies

the signal from iodine contrast medium injection to the artery, resulting in improvement of image resolution and obviating the need for intraarterial catheterization. The basic process involves storage of the image of the arterial field in digital memory before injection of the contrast medium. Subsequent images following iodine dye injection are sequentially subtracted by computerized digital video image processing. The subtracted images of the arteries thus obtained are enhanced by the contrast medium and the final displayed image is available on video tape or on a standard photograph. The radiation exposure is comparable to standard angiography. Although relatively minor defects such as patient motion, dye extravasation or inadequate venous access may require refinement, this technique, by providing precise arterial definition, is now practical, acceptable clinically and shows promise in areas of vascular diagnosis currently primarily screened by non-invasive studies.

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## Home Parenteral Nutrition

HOME PARENTERAL NUTRITION has become a readily available and effective therapy for a select group of patients who might otherwise die or be disabled for lack of a functional small intestine. Originally introduced by Scribner and Cole in 1970 as an "artificial gut," the technique has since been reported in more than 500 patients—neonatal through geriatric—and is no longer considered experimental.

Candidates for home parenteral nutrition include well-motivated patients who have massive small bowel resection, radiation enteritis, intractable small bowel fistulas, severe small bowel mucosal disease, pseudo-obstruction and some adults and many children with intractable Crohn's disease. Before home parenteral nutrition is begun, patients should be evaluated for surgically correctable disease and considered for home enteral nutrition.

The standard treatment has three stages. First, total parenteral nutrition is initiated in hospital until metabolic parameters are stable. Second, thorough instruction is given to the patient or parents in aseptic technique, details of the infusion and potential complications. The third phase is outpatient management. Though initial stabilization and teaching are still probably best done at a medical center with a multispecialty team committed to maintaining a home parenteral nutrition program, patients usually return home for long-term management.

Though catheter-related sepsis remains a problem, advances in vascular access techniques and solution

preparation have decreased risks. The best results have been reported using central venous placement of a silastic catheter (Hickman or Broviac) with a subcutaneous tunnel and a Dacron cuff to prevent ascending infection. The catheter may be placed using local anesthesia via cutdown or simply percutaneous subclavian placement through a breakaway introducer. Preformulated home total parenteral nutrition solutions are available, though many long-term patients may be taught to safely prepare solutions at home with a greatly decreased cost and a heightened feeling of independence.

Benefits are significant. In adults normal body composition and weight develop and in children with Crohn's disease and in neonates, normal growth patterns develop. Most patients are able to obtain adequate nutrition by continuous infusion while sleeping and may resume normal activities during the day; in one report, 70 percent of patients returned to usual employment. Costs of approximately \$20,000 a year are significantly less than in-hospital therapy and complications have been much less frequent than that generally reported for in-hospital parenteral nutrition.

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## Carotid Endarterectomy

ENDARTERECTOMY of the common carotid bifurcation has become established as a popular operation, with 40,000 done annually. It has a low risk, averaging 2 percent to 3 percent combined morbidity and mortality in most experienced centers.

Its role in the treatment of transient ischemic attacks is well accepted. The role in the treatment of asymptomatic lesions is less clear. Tight stenoses, bilateral stenoses and large or compound ulcers (which are better described as compound deformities rather than ulcers) are being accepted as anatomic indications for operation. The large compound ulcer is associated with a stroke rate of 7½ percent per year; even intermediate (type B) ulcers have a rate of 4½ percent per year. Combined, their average is that of the risk rate of stroke in the presence of transient ischemic attacks, though the risk of an ulcerative lesion increases with time instead of being maximal in early follow-up years.

Noninvasive evaluation of the carotid artery has become increasingly sophisticated and shows promise of increasing accuracy in identifying ulcerated, nonstenotic lesions. The usefulness of noninvasive evaluation of a symptomatic carotid lesion is limited, however, and negative findings from noninvasive studies should never preclude arteriography in a symptomatic patient. The real clinical role lies in the evaluation of asymptomatic lesions and in following patients after operation.

Digitalized subtraction angiography has not yet fully

supplanted noninvasive or physiologic studies or classical arteriography.

In the conduct of the operation itself, the use of the shunt remains debatable. Its use is generally accepted in the presence of stump pressures below 25 torr, when serious stenosis exists contralaterally, and in poststroke patients. Some surgeons, however, never use the shunt. Few surgeons use patches except in very small arteries and, as a rule, use only autologous tissue.

Open operative dilatation of difficult-to-reach fibromuscular lesions is now standard, but percutaneous transluminal angiography is not acceptable because of its inherent risk of distal embolic formation.

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## Vascular Access for Treatment of Acute Renal Failure

ALTHOUGH THE Quinton-Scribner arteriovenous shunt remains the most widely used form of vascular access for acute hemodialysis, there exists a significant number of patients for whom this procedure is not well suited. This group is often better served by some form of venovenous access. Such access usually requires placing two catheters into the iliofemoral venous system using the Seldinger technique. It is even possible to use single-needle dialysis equipment that alternately removes and returns blood through one cannula.

The venovenous method has become the preferred method when there are contraindications to the use of an arteriovenous shunt. Hemodynamically unstable patients present several problems. Hemodialysis tends to cause episodes of hypotension with poor blood flow from the arterial cannula. Also in such patients thrombosis frequently develops in their arteriovenous shunts between dialyses. With venovenous access flow can be maintained during hypotensive periods and catheters are usually removed between treatments. Patients in whom renal recovery is unlikely to occur should have venovenous access, because the use of an external arteriovenous shunt limits the sites available for the more durable subcutaneous access necessary for ongoing hemodialysis. Some patients lack the vasculature necessary for Quinton-Scribner shunts because of arteriosclerosis, drug abuse, major burns or use for intravenous or intraarterial cannulas. Finally, because of the simplicity and greater ease of placement in the setting of an intensive care unit, patients who are likely to require only one or two dialysis treatments (for example, drug overdose patients) are best served by venovenous dialysis.

There has been some concern regarding thromboembolic complications with repeated femoral vein catheterization, particularly when catheters are left in place.